

El Niño-Southern Oscillation



Scientists think that many floods as well as New England's ice storm in the winter of 1998 may have been related to El Niño.

The term *El Niño* (Spanish for "the little boy" or "the Christ Child") was originally used by fishermen along the coasts of Ecuador and Peru to refer to above-normal sea-surface temperatures that typically appear around Christmastime in the eastern Pacific Ocean and last for several months.

El Niño's effects are not limited to Peru and Ecuador. They can affect weather patterns around the world, and the disruption of the normal climate can have profound and even tragic consequences.

How Does El Niño Work?

In normal years, the winds tend to blow from east to west across the waters of the tropical Pacific. The easterly winds push the surface waters westward across the ocean. In turn, this causes deeper, colder waters to rise to the surface. This "upwelling" of deep ocean waters brings with it the nutrients that otherwise would remain near the bottom. The fish populations living in the upper waters are dependent on these nutrients for survival.

During El Niño years, the winds weaken, causing the upwelling of deep water to cease. The consequent warming of the ocean surface further weakens the winds and strengthens El Niño. As the ocean warms, the warmer water shifts eastward and so do the clouds and thunderstorms that produce heavy rainfall along the equator. This results in changes in jet streams (winds aloft), which lead to dry conditions in Indonesia and Australia, and floods in Peru and Ecuador. El Niño events occur on average every 3 to 5 years.

El Niño's Effects

The 1982-83 El Niño was unusually strong. In Ecuador and northern Peru, up to 100 inches of rain fell during a six-month period, transforming the coastal desert into a grassland dotted with lakes. Abnormal wind patterns also caused the monsoon rains to fall over the central Pacific instead of on the western edge, which led to droughts and disastrous forest fires in Indonesia and Australia. Overall, the loss to the global economy as a result of the El Niño amounted to more than \$8 billion.

Likewise, the winter of 1997-1998 was marked by a record-breaking El Niño event. The result was unusual weather in parts of the world, including the U.S. Severe weather events included flooding in the southeastern United States, major storms in the Northeast, and flooding in California.

La Niña

El Niño's twin sister is La Niña ("the little girl" in Spanish). La Niña is characterized by below-normal sea surface temperatures in the eastern equatorial Pacific. There are large swings in weather for many U.S. locations—from warm spells to cold waves—during a La Niña winter. The effects of La Niña tend to be nearly the opposite of El Niño—for instance, precipitation is below normal in California and the southeastern U.S.

El Niño and Global Warming: Any Connection?

Scientists still cannot say with certainty that global warming is affecting El Niño events. In January 1999, however, scientists at the National Center for Atmospheric Research and elsewhere reported that global warming may accentuate El Niño's current and future impacts. El Niño events have become more frequent and have had greater climate impacts over the past century. This change in El Niño events corresponds to a rise in global temperatures.



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